

REMARKS/ARGUMENTS

Favorable consideration of this application in light of the following discussion is respectfully requested.

Claims 1-18 are pending in the application with Claims 1-5 and 7-18 amended by the present amendment.

In the outstanding Office Action, Claims 1-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mori et al. (U.S. Patent No. 6,242,825) in view of Ford (U.S. Patent No. 2,230.922).

In light of the new ground for rejection, the claims have been amended to clarify the claimed subject matter and thereby more clearly patentably define over the cited art. To that end, the independent Claims have been amended to recite inorganic particles supported with the mica tape using an adhesive --comprising a first component having mutual dissolubility with the impregnating resin and a second glue component insoluble in the impregnating resin --. This amendatory language is consistent, for example, with the disclosure at page 11, lines 19-22 of the specification, which identifies an example of a “first component” of the adhesive, an epoxy resin composition, in conjunction with the disclosure at page 11, lines 11-18 of a “second component” disclosed as a polyvinyl-based polymer. Accordingly, no new matter has been added.

The adhesive used according to the claimed invention to support inorganic particles on the mica tape includes a first component (e.g., epoxy resin) that is soluble in the impregnated resin and a second glue component (e.g., glue: polyvinyl-based polymer) that is insoluble in the impregnated resin (e.g., adhesive = first component + second glue component). In other words, the first component is separate and distinct from the second glue.

An exemplary embodiment of the first component (e.g., epoxy resin) that is soluble in the impregnated resin is described in the specification, page 11, lines 19-22 (first embodiment), page 14, lines 17-20 (second embodiment), and page 15, lines 22-25 (third embodiment). Exemplary embodiments of the second glue component (e.g., glue: polyvinyl-based polymer) that is insoluble in the impregnated resin are described as 0.5 wt% to 5 wt% of polyvinyl alcohol in the specification, at page 11, lines 11-16 and page 13, lines 7-16 (first embodiment), 3 wt% of polyvinyl acetal (= polyvinyl butyral) in the specification, at page 14, lines 7-11 (second embodiment), and 3 wt% of polyvinyl acetal (= polyvinyl formal) in the specification, at page 15, lines 12-16 (third embodiment).

Exemplary embodiments of the impregnated resin (a composition comprising a cycloaliphatic epoxy compound, an acid anhydride curing agent, and a reactive diluent) are described in the specification, at page 12, lines 1-4 (first embodiment), at page 15, lines 2-6 (second embodiment), and at page 16, lines 7-10 (third embodiment).

Accordingly, no new matter has been added by the present amendment.

The outstanding Official Action of Claims 1-18 under 35 U.S.C. § 103(a) appears to be based on the finding that although Mori et al. does not specifically discloses an adhesive containing a glue insoluble in the impregnated resin being used to support the particles with the mica tape, Ford discloses high voltage coil insulation comprising an adhesive composition containing a glue insoluble in a dielectric material, wherein the glue is polyvinyl alcohol or polyvinyl acetal (page 2, lines 37-74). The outstanding Official Action on that basis reaches the conclusion that it would have been obvious to one skilled in the art to use the adhesive as taught by Ford in the mica tape of Mori et al. to fix the inorganic particles of Mori et al. within the mica tape and to bond the layers of the mica tape to each other.

However, it is Applicants' view that the above noted rationale does not take into account aspects of the present invention as accentuated by the amended claims. Therefore

what follows is a brief overview of the present invention followed by a discussion of the prior art.

Applicants' invention relates to a coil for an electric rotating machine wherein a mica tape, which includes mica flakes and cloth-like backing materials, is wound as a plurality of layers around a conductor including a plurality of Roebel-transposed square strands, and the layers of the mica tape are impregnated with an impregnating resin and then cured. The feature of this coil is that insoluble glue is contained as one constituent in an adhesive for bonding inorganic particles to the mica tape. As stated in the amended claims, the adhesive contains another constituent having mutual dissolubility with the impregnating resin

In commonly-used impregnation insulation for impregnating a mica tape wound around a conductor with an impregnating resin, which is one of methods of insulating an armature coil of a high-voltage electric rotating machine, an adhesive in the mica tape has mutual dissolubility with the impregnating resin such that they can be formed integrally with each other. If, therefore, inorganic particles are supported using the adhesive, the adhesive dissolves mutually with the impregnating resin and loses its supporting function. In the subsequent pressure molding step, thermal-conductivity inorganic particles heat flow out of the mica tape layers together with the residual adhesive and the impregnating resin to thereby decrease the thermal conductivity of an insulation layer of a coil. According to the present invention, the above problem is resolved by adding to the adhesive a second glue component insoluble in the impregnating resin, such as polyvinyl alcohol, to a first component, such as epoxy resin, having mutual dissolubility with the impregnating resin for supporting the inorganic particles. The first function necessary for the second glue component is to not interfere with mutual dissolubility between the impregnating resin and the adhesive in the mica tape. This first function is disclosed in neither Mori et al. nor Ford.

The mica tape wound around the conductor is pressurized by a pressure jig. The residual impregnating resin including the adhesive component mutually dissolvable with the impregnating resin are squeezed from the mica tape layers. Conventionally, the inorganic particles may also flow out together with the residual impregnating resin and the adhesive. If, however, there is provided in the adhesive a second glue component insoluble in the impregnating resin of the first glue component, the second glue component increases the viscosity of the adhesive and its high-molecular chain catches the inorganic particles to prevent the inorganic particles from flowing out. The second function necessary for the second glue component of the adhesive is therefore to increase the viscosity of the adhesive and catch the inorganic particles to prevent them from moving. Stated differently, "the supporting effect of polyvinyl alcohol [the second glue component] prevents the flowing out of the inorganic particles 14 with impregnated resin from the insulation wall 8 even within the heat pressing is applied to form a final section."¹ This second function is disclosed in neither Mori et al. nor Ford.

Consequently, the second glue component of the claimed adhesive, insoluble in the impregnating resin, need not function as an adhesive, nor does Ford disclose or suggest that such is the case.

Reiterating, the first component (epoxy resin) that is soluble in the impregnated resin and the impregnated resin (a composition comprising a cycloaliphatic epoxy compound, an acid anhydride curing agent, and a reactive diluent) are both resins, but different in composition. The adhesive component which is squeezed out of a coil together with an excess impregnated resin at the time of heat pressing is the first component that is soluble in the impregnated resin of a mica tape adhesive. The adhesive component which is heated and cured in a coil together with an impregnated resin after heat pressing is the first component of

¹ Specification, page 13, lines 17-21, and page 17, lines 12-16..

a mica tape adhesive, which is soluble in the impregnated resin and the second glue component of the mica tape adhesive, which is insoluble in the impregnated resin. Consequently, the adhesive component which is squeezed out of a coil together with an excess impregnated resin at the time of heat pressing is limited to the first component that is soluble in the impregnated resin.

Ford does not disclose that the adhesive contains two components. The adhesive of Ford is used to bond the turns of a coil. It is favorable that the adhesive is a thermoplastic, because a tape coated with the thermoplastic is wound around the coil, the coil is pressurized and heated, and the thermoplastic is melted and then cooled, thereby bonding the turns of the coil. After that, the coil is impregnated with an insulating oil. If the adhesive of Ford is dissolved in the insulating oil, the turn of a coil is separated. The adhesive of Ford therefore needs to be insoluble in the impregnating insulating oil. Consequently, it is evident that the adhesive of Ford is not an adhesive containing two components including a first component soluble in the impregnating material and a second glue component insoluble in the impregnating material.

It is evident from the above that neither of Mori et al. and Ford discloses or suggests "inorganic particles supported with the mica tape using an adhesive comprising a first component having mutual dissolubility with the impregnating resin and a second glue component insoluble in the impregnating resin" as recited in Applicants' amended claims. Accordingly, it is respectfully submitted that the amended claims patentably define over the cited art and that the outstanding rejection has been overcome.

Amended Claims 13 and 16 further recite a mica tape and a mica sheet, respectively, which are so configured that inorganic particles are supported by a glass cloth backing using an adhesive containing a first component having mutual dissolubility with the impregnating resin, and a second glue component insoluble in the impregnating resin as an indispensable

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component. It is respectfully submitted that this mica tape or mica sheet is also not disclosed or suggested by Mori et al. or Ford.

Consequently, in view of the present amendment and in light of the above discussion, Claims 1-18 as presented herewith are believed to be patentably distinguishing over the cited art and in condition for allowance. An early and favorable action to that effect.

Respectfully submitted,

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